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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/732,927 | 12/11/2000 | Nobuo Shimazu | 740107-135 | 2306 |

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EXAMINER

FERNANDEZ, KALIMAH

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2881

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/732,927

Applicant(s)

SHIMAZU ET AL.

Examiner

Kalimah Fernandez

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 1 is objected to because it is unclear how the master mask is used in the electron beam proximity method to manufacture the child mask. Namely, as worded the claim language can encompass a method, in which data generated using the master mask can be used in the exposure method to fabricate child mask, or a method of using the master mask in the exposure apparatus itself to expose and fabricate a child mask. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

And;

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1, 5, 8, and 12 are rejected under 35 U.S.C. 102(e) as being anticipate by US Pat No 6,177,680 issued to Dick et al.

5. Dick et al discloses a method for manufacturing an object mask employing an electron beam exposure apparatus (col.2, lines 5-36).

6. Dick et al discloses manufacturing identical/child masks using the final pattern control data using the calibration/ mask (col.5, lines 45-55).

7. Moreover, Dick et al discloses writing a calibration pattern on a first mask using "an intermediate set of beam control data"; using the calibration mask to generate a corrected mask pattern; and finally writing the corrected mask pattern onto a second/ child mask (col.6, lines 1-40).

8. In addition, Dick et al teaches the exposure of the identical pattern data of the calibration mask onto the child mask as a substitute to compensate for distortions (col.4, lines 20-35; col.5, lines 31-45).

9. As per claims 5 and 12, Dick et al teaches measuring the distortion generated manufacturing the calibration mask (col.5, lines 15-31). Dick et al, also, teaches the correction of the beam deflection (i.e., application direction of the electron beam) in

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accordance with the corrected data generated using the calibration mask (col.5, lines 32-45).

10. Claims 1 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 3,874,916 issued to Livesay et al.

11. Livesay et al discloses the fabrication of a master mask having a pattern (24) (col.5, lines 8-19).

12. Livesay et al discloses the use of said master mask to create a mask blank/ final mask (col.4, lines 63-65). Livesay et al discloses fabrication of child mask(s) by electron exposure of said mask blank (col.6, lines 22-28).

13. Claims 1 and 8 are rejected under 35 U.S.C. 102(b) as being anticipated by US Pat No 4,827,138 issued to Randall.

14. Randall discloses manufacturing a master mask and using said master mask to manufacturing child mask(s) (col.5, lines 39-50).

15. Randall discloses proximity printing and a 1:1 correspondence between the mask pattern and printed pattern (col.3, lines 47-53).

16. In addition, Randall discloses the use of electron beam lithography (col.3, lines 59-68).

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. Claims 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Randall.

19. Randall teaches the claimed invention except for using the child mask as the master mask in the electron beam proximity exposure method.

20. Rather, Randall teaches the use of the first mask fabricated as the master mask (col.5, lines 43-45).

21. However, it would have been obvious to an ordinary artisan to use the second mask fabricated as the master mask or using each previous mask to fabricate the next mask since the breadth of Randall's disclosure suggests that any mask fabricated according to the disclosed method can act as a master mask.

22. Claims 2,4,9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Randall and in view of US Pat No 4,463,265 issued to Owen et al.

23. Randall teaches the claimed invention except for "the master mask is exposed from a side facing the child mask and the child mask from the side facing the object". In addition, Randall does not teach manufacturing the "child mask is n-times, a pattern exposed on the master mask is pattern right and left reversed from a pattern on the object when n+1 is an odd number and the pattern exposed on the master mask is a pattern non-reversed from the pattern on the object when n+1 is an even number".

24. However, Owen et al teaches the technique for compensates for the reduction in resolution due to the proximity effect, in which a reverse field pattern is defined as the negative of the circuit pattern to be drawn (col.4, lines 1-16).

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25. Owen et al teaches exposing a workpiece (or a child mask) to a desired pattern and subsequently exposing said workpiece (or child mask) to a reverse exposure (col.6, line 49- col.7, line 3; col.8, lines 57-67).

26. It would have been obvious to an ordinary artisan to combine the teachings of Randall and Owens et al since Owens et al discloses the advantage of compensation for the proximity effect caused by electron exposure (see col.9, lines 5-30). That is, an ordinary artisan would have found obvious motivation to expose the reverse pattern of master mask onto the child mask to compensate for the proximity effect as taught by Owens et al.

27. Claims 5-7 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Randall and in view of Dick et al.

28. Randall teaches the claimed invention except for correcting distortion.

29. However, Dick et al teaches generation of corrected pattern data, which measures distortion and compensates for said distortion by changing the beam control data including the beam deflection (i.e. the application of the beam direction) (col.5, lines 15-45).

30. It would have been obvious to an ordinary skilled artisan to combine the teachings of Randall and Dick et al since Dick et al teaches fabrication of mask free of pattern-dependent errors with the advantage of a reduction in processing time (col.2, lines 1-5).

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31. As per claims 6-7 and 13-14, the obvious combination of Randall and Dick et al reads on extending the correction to the distortion generated when using the master mask in fabricating the child mask.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kalimah Fernandez whose telephone number is 703-305-6310. The examiner can normally be reached on Mon-Fri between 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Lee can be reached on 703-308-4116. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

kf
July 1, 2002


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
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